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Dynamic Relationships among Oil revenue, Government Expenditure and Economic Growth in Nigeria

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ABSTRACT

This paper investigated the dynamic relationships among oil revenue, government expenditure, and economic growth in Nigeria between 1981 and 2023 using data sourced from the World Bank Development Database and the Central Bank of Nigeria Statistical Bulletin. The data were estimated using ARDL methodology, and specific analysis such as correlation studies, stationarity tests, hypothesis testing, cointegration analysis for long-run relationships, estimation of coefficients for short and long runs, and stability tests were estimated. After establishing a long-run relationship among the variables, the error correction model was estimated as well as the Granger causality test. The results of the short run and long run showed positive effects of government spending and oil revenue on economic growth. The Granger causality revealed that government expenditure Granger caused both oil revenue and economic growth in Nigeria over the period of the study. It is recommended that Nigeria diversify its economy away from oil exports.

Keywords: : Oil Revenue, Government Expenditure, Cointegration, Short Run, Long Run and Nigeria

JEL Codes: Q43, H50, O47

1.0 INTRODUCTION

The relationship between oil revenue, government expenditure, and economic growth is complex and varies across different contexts. In countries like Nigeria and Malaysia, oil revenue significantly influences government spending, which in turn impacts economic growth. Effective management of these revenues is crucial for sustainable development and fiscal stability. Oil revenue serves as a primary source of funding for government expenditure, particularly in oil-dependent economies like Nigeria, where over 90% of export revenue comes from oil. When compared to several other countries in the globe, Nigeria's economic growth has been unreliable, unstable, and unsatisfactorily low in recent years, making it a developing economy (Machi, 2011). Being Africa's biggest oil exporter and an economy that depends heavily on oil, the nation has seen numerous oil price shocks and disruptions over the years because of global oil price volatility. Since the 1990s, the world powers' actions on the international market have caused fluctuations in the price of oil. Anyanwu *et al.* (1997) assert that oil revenue has turned poor nations into wealthy ones, transformed deserts into fertile

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lands, and converted bankrupt countries into creditors. From 1981 to 2023, oil revenue accounted for 60.5% of Nigeria's total revenue (NBS, 2023).

In addition to the ongoing decline in oil prices in the past, one noteworthy recent event was the sharp decline in oil prices from $112 per barrel in 2014 to nearly $38 per barrel at the end of 2015. This was caused by the United States' continuous and enormous supply of shale oil to the world market (British Petroleum Statistical Review of World Energy, 2017). Based on available data, the average price per barrel of oil for OPEC was approximately $43.29, $50.80, $65.23, $56.99, $39.68, $68.17, $94.53, $77.64, and $75.83 for the years 2016 to 2024, respectively. As of March 2025, the average price of the OPEC basket, a weighted average of prices for petroleum blends produced by OPEC member countries, is $72.9 per barrel. According to the International Energy Agency (IEA, 2015), Nigeria's oil export revenue in 2014 was $77 billion. Nigeria's oil earnings, however, dropped to $41.33 billion in 2015 because of the decline in the price of oil. According to data from the Nigerian Upstream Petroleum Regulatory Commission, a federal government agency, Nigeria's crude oil exports totalled 502,400,000 barrels in 2022, 552,841,582 barrels in 2023, and 408,680,457 barrels in 2024. These exports generated revenues of $47.5 billion in 2022, $42.9 billion in 2023, and $31 billion in 2024. Consequently, the decline in global oil prices implies that Nigeria's economy is experiencing financial losses and struggling to achieve sustainable growth. This is primarily due to the heavy reliance on oil exports as a major source of government revenue. Moreover, the volatility of oil prices has continually threatened the country's mono-product economy since the onset of oil drilling in the 1970s. As a result, the government has been compelled to recognize the growing urgency of diversifying the economy beyond the oil sector and into non-oil industries.

From the figures above, Nigeria's economy has experienced cyclical patterns of booms and recessions, largely driven by the volatility of oil prices. During periods of high oil prices, government spending tends to rise sharply, often without corresponding improvements in economic productivity. Conversely, oil price declines lead to fiscal deficits, reduced capital investments, and economic slowdowns. This raises concerns about the long-term sustainability of an oil-dependent growth model, given its susceptibility to external shocks. Moreover, inefficient public spending, weak institutional frameworks, and structural bottlenecks have further complicated the effectiveness of government expenditure in driving economic growth. Existing studies have examined the linkages between oil revenue and economic performance, but there is a need for a more comprehensive understanding of the dynamic interrelationships among oil revenue, government expenditure, and economic growth in Nigeria. While some researchers argue that oil wealth can be leveraged for sustainable development through prudent fiscal policies, others highlight the risks of the resource curse, where excessive dependence on oil revenue leads to macroeconomic instability and weak economic diversification. For instance, the unemployment rate in Nigeria increased from 10.4% by Q4 of 2015 to 33.3% by Q4 of 2020. The inflation rate increased from a single digit of 9.6% in January 2016 to a double digit of 11.4% in February 2016 and continued to rise, reaching 26.7% as of September 2023

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(NBS, 2023). This trend raises the question of whether there is a positive relationship among oil revenue, government expenditure, and economic growth in Nigeria.

This study therefore aims to contribute to the ongoing discourse by empirically analyzing the short- and long-run interactions among these key variables. Using advanced econometric techniques, such as Vector Error Correction Models (VECM) and Granger causality tests, this paper investigates whether oil revenue drives economic growth through government expenditure or whether inefficient fiscal management weakens the potential benefits of oil wealth. The findings will provide valuable policy insights on optimizing resource allocation, enhancing fiscal sustainability, and promoting long-term economic growth in Nigeria.

2.0 CONCEPTUAL REVIEW

2.1 Oil Revenue

This is the total amount of income derived from the sales of crude oil and refined petroleum products annually in the country, both internally and internationally, in local currency units (Naira) (Idekwulim, 2014). The oil revenue includes proceeds from sales of crude oil, petroleum profit tax, rents, and royalties. Prior to the discovery of oil in Nigeria, the agricultural sector was the mainstay of the Nigerian economy, contributing about 95% to her foreign exchange earnings, generating over 60% of her employment capacity, and approximately 56% to her gross domestic earnings (World Bank, 2013). Nigeria's oil sector revenue share in 2009 was 78.8%, compared to just 21.2% in the non-oil sector (CBN, 2018). Oil revenue as a share of total government revenue declined from about 75 percent in 2012 to about 47 percent in 2016 and further to about 29 percent in 2023 (CBN, 2023). Despite this significant decrease, it still plays a major role in shaping the bearing of the Nigerian economy. Considering the over-reliance of the economy on oil vis-à-vis the volatility of the oil market, the Nigerian economy is exposed to external shocks from the oil market (Abubakar, 2017).

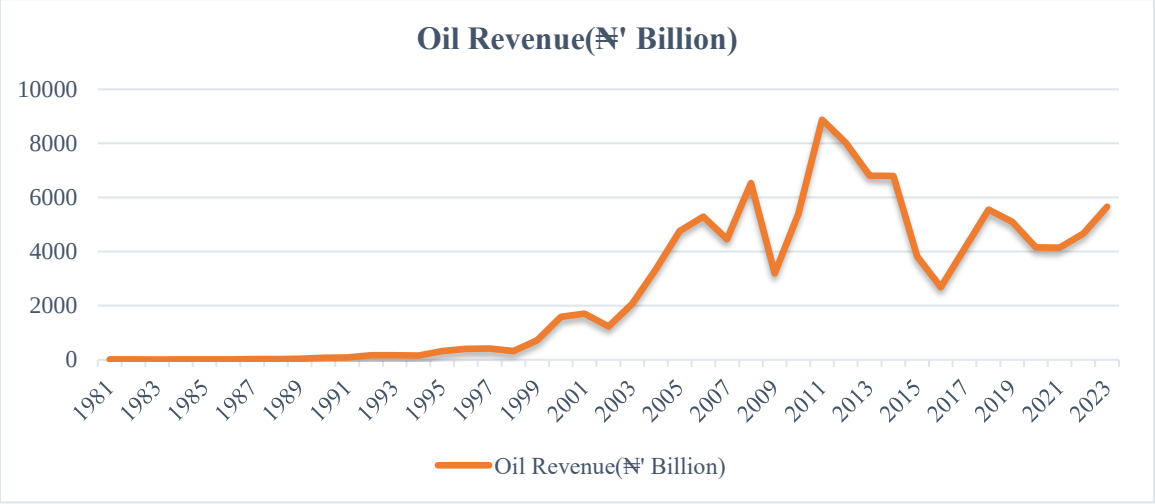

Figure 1: Oil Revenue Trend in Nigeria from 1981-2023

Source: Central Bank of Nigeria (2024)

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2.2 GDP Per Capita

GDP per capita growth is the annual percentage change in the gross domestic product (GDP) per capita. It is a key indicator of economic growth, as it measures the total economic output of a country relative to its population. According to Juliannisa and Artino (2022), GDP per capita is important for the economy because it is a reference to determine the results of a series of economic activities of a country for one year.

It is calculated by dividing the change in real GDP by the population. The formula for calculating the growth rate is:

$$Per\ Capita\ GDP_y = \frac{Real\ GDP_y}{Population_y}$$

Where y denotes the year.

GDP per capita growth is a significant indicator because it can provide insights into economic disparities, productivity, and consumption patterns. A strong increase in real GDP can also indicate that an economy is doing well, and that employment is likely to be increasing. GDP per capita growth is a measure of the rate at which a country's income per person is increasing. It's a key economic indicator that reflects the overall well-being of a country's population.

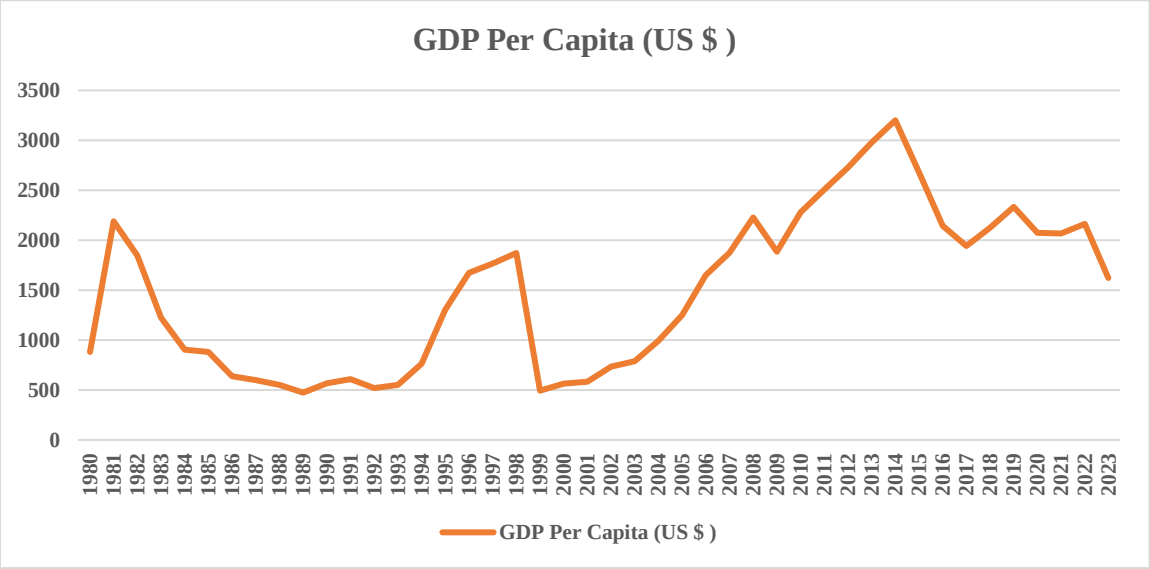

Figure 2: GDP Per Capita in Nigeria from 1980-2023

Source: World Bank Data (2024)

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2.3 Foreign Direct Investment (FDI)

According to the United Nations (2009), foreign direct investment (FDI) is an investment made to acquire a long-term interest in or effective control over a company that operates outside of the investor's economy. FDI net inflows are the value of non-resident investors' inward direct investment in the reporting economy, which includes reinvested earnings and intra-company loans, minus capital repatriation and loan repayments. FDI net outflows are the value of outward direct investment made by residents of the reporting country to external economies, including reinvested earnings and intra-company loans, after deducting receipts from capital repatriation and loan repayment.

Nigeria no doubt requires substantial amounts of foreign investment to speed up her economic growth, which will in turn boost GDP. The significance of foreign capital for the provision of infrastructure development for both macroeconomic and microeconomic activities of society cannot therefore be overemphasized. Foreign direct investment (FDI) is a vital aspect of the international economic system and a major driver for development, as summarized succinctly by the Organization for Economic Cooperation and Development (OECD) in 2002. The World Bank defined FDI as net inflows of investment to acquire a long-term management stake (10 percent or more of voting stock) in a company operating in a different economy than the investor's. Net FDI is a better measure of FDI because it shows the amount of new investment inflows minus disinvestment in a country. FDI improves economic efficiency by increasing international trade, competitiveness, access to overseas markets, and workforce training. In the study of the determinants of FDI in Nigeria, Anyanwu (2007) identified change in domestic investment, change in domestic output or market size, indigenization policy, and change in economic openness as major determinants of FDI. Given the role of foreign capital inflows as an investment mechanism for economic growth in most countries, it is a strong indicator of a nation's economic strength. Nigeria is a major beneficiary of foreign direct investment (FDI) inflows in Africa while having a lower share of worldwide FDI inflows than other African countries. FDI inflows to Nigeria have witnessed a downward trend in recent years. According to World Bank data (2023), FDI net inflows to Nigeria reached US$2.3 billion (0.49% of GDP) in 2019, and it increased slightly to US$2.39 billion (0.55% of GDP) in 2020. In 2021, FDI reached 3.31 billion (0.75% of GDP), decreased significantly to minus US$0.19 billion (-0.05% of GDP) in 2022, and increased to US$1.87 billion (0.52% of GDP) in 2023. Ozili (2025) argued that the decrease in FDI inflows to Nigeria is attributable to small market size, lack of economic freedom, volatile exchange rates, and low economic growth rates. Recently, great attention has been paid to the determinants of economic growth, and there is much emphasis on the effect of FDI inflows on economic growth. While some studies like Alabi (2019), Bakari *et al*. (2018), and Emako *et al.* (2022) have reported a positive relationship between FDI and economic growth, others like Okumoko *et al*. (2018) found an insignificant effect of FDI on economic growth in Nigeria. These varied results indicate that the impact of FDI on the recipient country's economic growth may be influenced by other factors.

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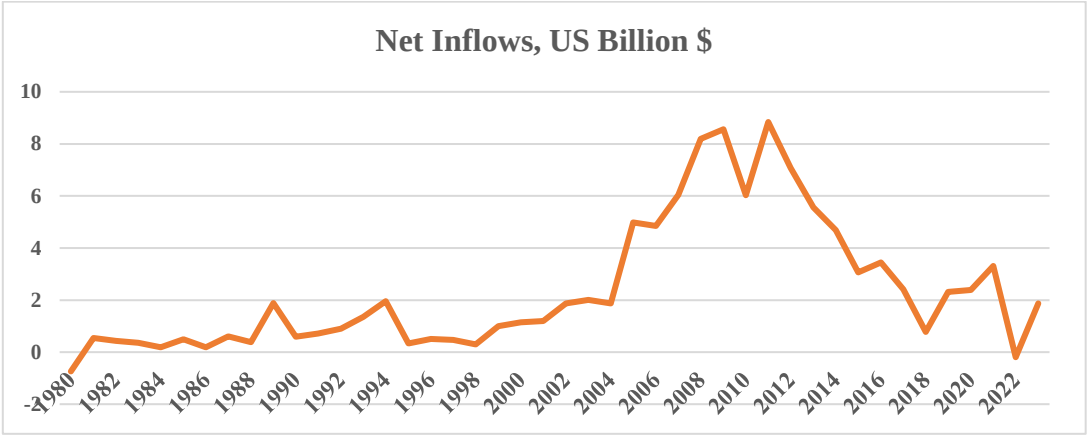

Figure 3: Net Inflow in Nigeria from 1980-2023

Source: World Bank Data (2024)

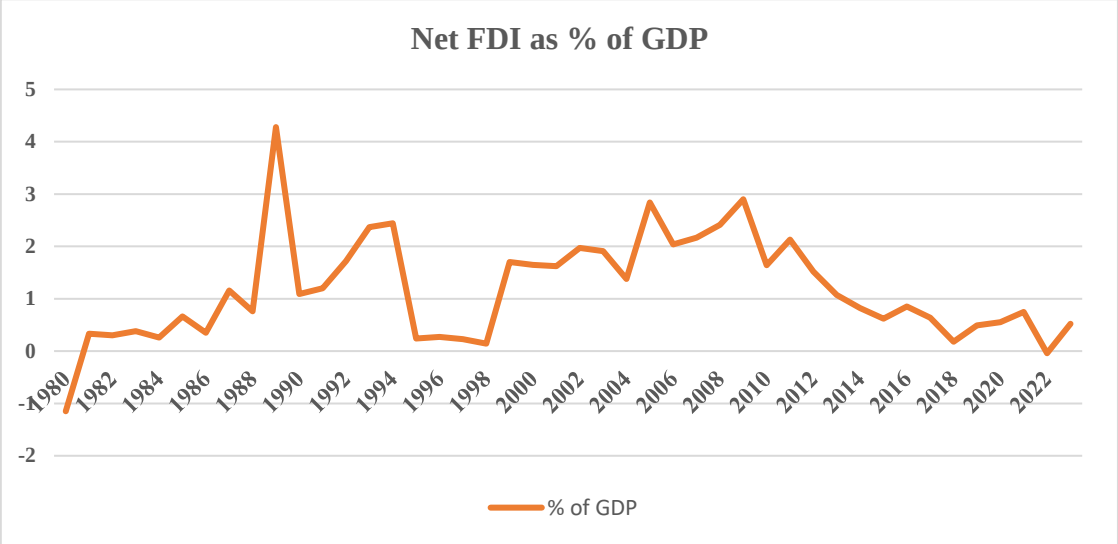

Figure 4: Net Inflow as % of GDP in Nigeria from 1980-2023

Source: World Bank Data (2024)

2.4 Total Government Expenditure

Total government expenditure refers to the overall amount a government spends on its activities and functions. This includes expenditures on goods and services, infrastructure, public administration, defense, education, healthcare, investments, and transfer payments, among others. In Nigeria, government spending has undergone significant changes between 1980 and 2023, influenced by various economic and policy developments. According to data from the Central Bank of Nigeria, public expenditure stood at ₦11.4 billion in 1980, representing 11.2% of the Gross Domestic Product (GDP). By 1989, it had risen to ₦41.0 billion, making up 12.66% of GDP. In 2000, total expenditure surged to ₦701 billion, though its share of GDP declined to 9.97%. By 2023, government spending had increased substantially to ₦19.8 trillion, accounting for 11.87% of GDP. This significant increase in public expenditure over time

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demonstrates the government's commitment to solving numerous economic difficulties and investing in key industries to boost growth and development.

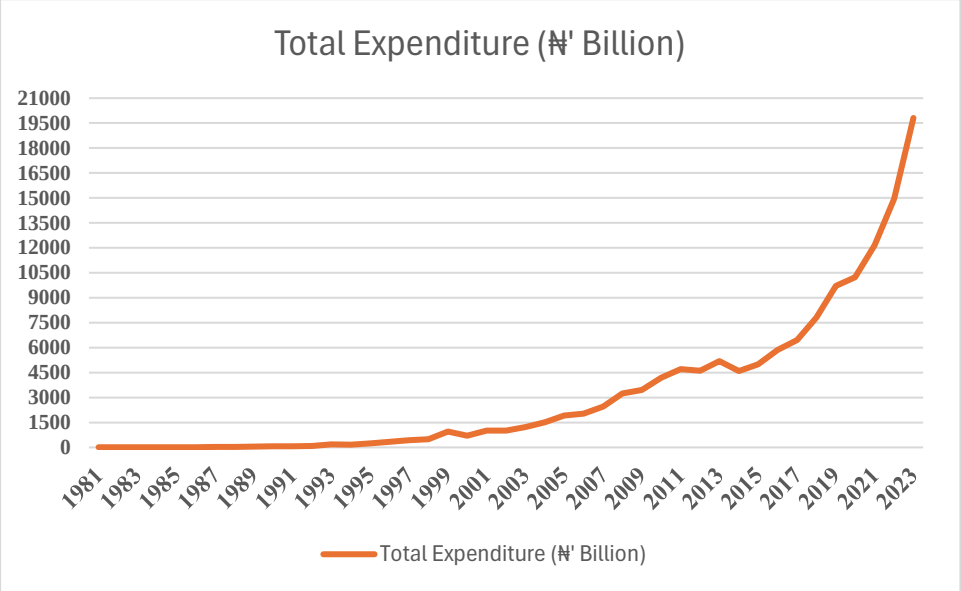

Figure 5: Total Government Expenditure in Nigeria from 1981-2023

Source: Central Bank of (2024)

2.5 Economic growth

Economic growth is an increase in the production of economic goods and services in one period of time compared with a previous period. Economic growth is measured as a percentage change in the gross domestic product (GDP) or gross national product (GNP) (Dwivedi, 2004). The GDP can be measured in nominal or real (adjusted to remove inflation) terms. Economic growth is one of the fundamental macroeconomic policy objectives that countries all over the world continue to strive to achieve, and Nigeria is not an exception. Nyoni and Wellington (2018) noted that policy variables that need to be handled with extreme caution to materialize real growth in Nigeria are population growth, inflation, FDI, interest rates, exports, private investment, and public investment. Drivers of economic growth have been identified to include natural resources, deregulation, technology, human resources, infrastructure, and social and political factors.

Based on data obtained from the World Bank and NBS, since independence to date, Nigeria has achieved the highest GDP growth rate of 25.1% in 1970. Since 1970, Nigeria has recorded a negative growth rate in the following years: 1975 (-5.23%), 1978 (-5.76%), 1981 (-13.13%), 1982 (-6.80%), 1983 (-10.92%), 1984 (-1.12%), 1993 (-2.04%), 1994 (-1.81%), 1995 (-0.07%), 2016 (-1.62%), and 2020 (-1.76%). According to the Gross Domestic Product Report of CBN (2023), the annual GDP growth rate in 2022 stood at 3.10%, up from the 3.40% reported in 2021. Thus, the performance of agriculture and industry decreased in 2022 relative to 2021, while the performance of the services sector improved in 2022. Nigeria's economic growth has been affected by high inflation, a weak global economy, and insufficient electricity generation.

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However, the country's economy grew in the third quarter of 2024, with the non-oil sector growing the most.

Figure 6: GDP growth rate in Nigeria from 1981-2023

Source: World Bank (2024)

3.0 LITERATURE REVIEW

There are several studies on the relationship between oil revenue and government spending on the one hand and government expenditure and economic growth on the other hand for both developed and developing countries. However, the nature of the relationship is not conclusive. A review of previous studies includes the work of Ijirshar *et al*. (2023), who examined the relationship between government expenditure and economic growth and assessed the moderating effects of oil revenue and non-oil revenue in Nigeria from 1981 to 2021. From their findings, oil revenue significantly influences the relationship between government expenditure and economic growth in Nigeria. The study found that both oil and non-oil revenues positively affect this nexus, indicating that effective management of oil revenue can enhance economic growth. Government expenditure is identified as a crucial determinant of economic growth, with the research highlighting the importance of directing investments during periods of high revenue and ensuring fiscal sustainability to optimize the benefits of government spending on economic development. In a similar study, Zakaria *et al.* (2023) used an ARDL model and time series monthly data from 2000 to 2021 to analyze the impact of oil prices and government spending on economic growth in Malaysia. They realize that oil revenue and government expenditure significantly influence economic growth in Malaysia. The study reveals that rising oil prices positively impact economic activities, allowing the government to allocate more funds to productive sectors. Both oil prices and government expenditure have a favorable effect on economic growth in the short and long term.

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In a study by Awoyemi and Nwibe (2022) using pairwise Granger causality and annual time series data from 1980 to 2020 from the Central Bank of Nigeria (CBN) statistical bulletin, annual reports, and the World Bank Database, they investigated the relationship between oil revenue, health expenditure, and economic growth and concluded that oil revenue and health expenditure Granger cause Nigerian economic growth. The results show that there exists a bidirectional relationship between real GDP and total health expenditure. Nonetheless, the relationship between GDP and oil revenue is unidirectional. Furthermore, they reported a unidirectional relationship between oil revenue and health expenditure. Fasanya and Ogundare (2018) examined the impact of oil revenue and government expenditure on economic growth in Nigeria using the multivariate vector autoregression framework with special attention to the Generalized Impulse Response Function. Time series data from 1980 to 2015 was adopted. The findings show that oil receipts remain the major route by which public spending is financed.

Asangunla and Agbede (2018) examined the relationship between oil revenue and economic growth in Nigeria from 1981 to 2014 using secondary data sourced from the Central Bank of Nigeria. The study applied a modified version of the Beghebo and Atima model, utilizing the fully modified ordinary least squares (FMOLS) method for data analysis. The findings revealed that while oil revenue does not have a short-run influence on Nigeria's economic activities, its continuous increase is likely to drive long-term economic growth. The study recommended that the government allocate oil revenue efficiently and strategically to progressive ventures. Al-Rasasi *et al.* (2019) investigated oil revenues and economic growth in Saudi Arabia for the period 1970 to 2017 using data collected from the GASTAT and the Ministry of Finance of Saudi Arabia. The data was analyzed using stationary, cointegration, error correction model, and causality tests, with the results indicating a highly significant short- and long-run relationship between oil revenue and economic growth. The Ganger causality test revealed that real government oil revenue growth "Granger-caused" real private-sector GDP growth. Nwoba and Abah (2017) also investigated the impact of crude oil revenue on Nigeria's economic growth using ordinary least squares (OLS) regression analysis and data from 1960 to 2010. The study revealed that a long-run positive relationship exists between oil revenue and gross domestic product. Their findings provided empirical evidence that the production of crude oil and the existence of multinational oil companies in Nigeria have had a positive and significant impact on the country's economic growth and development. These effects include the creation of jobs through value-chain additions and direct and indirect employment generation from oil production activities.

Nweze and Edame (2016) examined the relationship between oil revenue and economic growth in Nigeria from 1981 to 2014 using secondary data from CBN publications. Gross Domestic Product (GDP) served as the dependent variable, while oil revenue (OREV) and government expenditure (GEXP) were the explanatory variables. Employing econometric techniques such as the Augmented Dickey-Fuller Unit Root Test, Johansen Cointegration Test, and Error Correction Mechanism (ECM), the study found that oil revenue positively impacts economic growth in the long run but has a negative short-run effect. This suggests that Nigeria has yet to

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utilize its oil revenue effectively and efficiently. The study recommended channeling petroleum revenue into other domestic sectors, supported by sound macroeconomic policies.

Olayungbo (2019) investigated the impact of oil revenue on Nigeria's economic growth using annual data from 1970 to 2015. Employing the Bayesian time-varying parameter (TVP) model, the study examined the resource curse hypothesis in Nigeria. The findings offered fresh insights into the oil curse phenomenon, revealing that while oil revenue exports had a positive and significant effect on economic growth throughout the study period, unfavorable trade openness and low educational quality served as key transmission channels for Nigeria's sluggish growth despite substantial oil earnings. The study recommended directing oil export revenues toward human capital development and tradable sectors to foster economic growth. The findings of Ibeh (2013) and Akinlo (2012) revealed that the petroleum industry has not really contributed significantly to the Nigerian economy; this is because the Nigerian government has not used the revenue generated from the sector efficiently. The industry has faced enormous challenges such as lack of infrastructure, lack of proper turnaround maintenance in the oil and gas industries, a high rate of corruption, militant insurgencies, the recent Boko Haram, bunkering, and all sorts of criminal activities. Shihab (2001) links abundant natural resources to economic collapse, civil conflict, and socio-economic instability. They argue that, among all natural resources, oil poses the highest risk of civil conflict due to the substantial rents it generates. Consequently, Nigeria must manage its petroleum resources prudently to prevent socio-economic decline. Similarly, Ibaba (2005) highlights Nigeria's ongoing developmental crises, including widespread poverty, declining economic growth, and the deterioration of local economies and social infrastructure. Corruption, financial mismanagement, and a lack of accountability in oil revenue management persist, even as the country maintains substantial foreign reserves. Al-Fawwazl and Al-Sawai (2013) used a Vector Autoregressive (VAR) model to analyze the relationship between Jordan's real GDP and real public spending from 1990 to 2010. The findings did not confirm Wagner's law but did show a unidirectional causal relationship between public spending and real GDP, supporting the Keynesian theory. In another study on Jordan, Al-Zeuod (2014) found that government expenditure Granger causes GDP in the short run fundamental source for growth, supporting the Keynesian school of thought, which holds that government spending boosts economic growth in Jordan.

4.0 OIL SECTOR REFORMS IN NIGERIA

The oil sector plays a crucial role in Nigeria's economic development, significantly contributing to foreign exchange earnings and government revenue. However, challenges such as corruption, inefficiencies, environmental pollution, and revenue leakages have necessitated comprehensive reforms to improve transparency, efficiency, and sustainability. Consequently, various policy measures and legislative frameworks have been implemented to enhance the sector's performance. Key reforms include the Petroleum Industry Act (PIA) 2021 and the Local Content Development Act (2010), among others. The PIA aims at addressing the issues in the governance, regulatory framework, and fiscal terms in the industry (Adams, 2022). Some key provisions of the Act include the commercialization of the Nigerian National Petroleum Corporation, which was transformed into Nigerian National Petroleum Corporation Limited,

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making it a profit-driven entity with operational independence and improved transparency. The PIA Act reduced administrative bottlenecks through the creation of the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) to regulate upstream operations and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) to oversee midstream and downstream activities. The Act also provides for the establishment of a 3% Host Community Development Fund to ensure that oil-producing communities that suffer from various environmental degradation due to oil spillage benefit directly from petroleum operations, thus minimizing conflict. The fiscal terms (taxation reforms) provided by the PIA attract foreign direct investment (FDI) into the sector, which includes reduced royalties and taxes for investors. The deregulation of the downstream sector through the removal of fuel subsidies is another notable reform in the Act. The aim of the deregulation is to allow market forces to determine petroleum product prices, thereby reducing the financial burden on the federal government. Although the deregulation has been met with resistance due to the economic difficulties caused by rising fuel prices and inflationary pressure (IMF, 2023).

The Nigerian Oil and Gas Industry Content Development Act (2010) was enacted to promote indigenous participation in the oil and gas sector. Its key objectives include increasing the utilization of Nigerian labor, goods, and services in oil and gas operations, fostering technology transfer and capacity building within the local industry, reducing reliance on foreign firms and expatriates, ensuring a designated percentage of oil contracts are awarded to Nigerian companies, and enhancing local refining capacity. To combat corruption and revenue leakages, the country has strengthened governance mechanisms through the Nigeria Extractive Industries Transparency Initiative (NEITI), ensuring public disclosure of contracts and oil revenues. Additionally, the adoption of electronic licensing and digital bid rounds has enhanced transparency in the allocation of oil exploration and production licenses. However, these reforms face several challenges, including bureaucratic inefficiencies, delays in implementing key legislative provisions, rising oil theft, pipeline vandalism, financial mismanagement, regulatory risks, and public resistance to subsidy removal.

5.0 SOURCES AND MEASUREMENT OF DATA

The variables used in this study are gross domestic product (GDP), oil revenue and government expenditure, consumer price index (CPI), and foreign direct investment. The data for oil revenue and government expenditure were sourced from the Statistical Bulletin published by the Central Bank of Nigeria (CBN, 2023), while the remaining variables were sourced from the World Development Indicator (WDI) data base. The sample period from 1981 to 2023 was chosen based on data availability. Gross Domestic Product (GDP) refers to the market value of all officially recognized final products and services generated in Nigeria. It is denominated in the local currency, naira. Government expenditure (GEXP) includes both the capital and recurrent expenditure incurred during the period of study. It also covers all government consumption, investment, and transfer payments throughout the sample period, which are measured in naira.

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5.1 Descriptive and Correlation Analysis

The descriptive statistics presented in Table 1 show the oil revenue, government spending, consumer price index, foreign direct investment inflow, and GDP variables in their units for the study period. The average mean of oil revenue shows a value of ₦2,627.56 billion, while those of the government expenditure and GDP variables are ₦3,186.50 trillion and ₦3.04 trillion, respectively. The values imply that the average value of government spending is more than oil revenue during the period of study. This is equally true for the maximum values. The minimum value of the oil revenue is more than the government expenditure variable. The skewness shows a positively skewed distribution for the variables over the sample periods. The significance value at 5 percent for the Jacque Bera indicates that all the variables reject the acceptance of the null hypothesis of normal distribution.

Table 1: Descriptive Statistics

Statistics	GDP	OILR	GEXP	CPI	FDI
Mean	3.04	2627.56	3186.50	93.01	1.22
Median	3.25	1707.56	1018.18	39.72	1.07
Maximum	15.33	8878.97	19808.44	524.91	4.28
Minimum	-13.13	7.25	9.64	0.49	-0.04
Std. Dev.	5.26	2668.44	4475.38	124.20	0.95
Skewness	-0.84	0.58	1.93	1.78	0.95
Kurtosis	4.85	2.08	6.60	5.72	3.76
Jarque-Bera	11.15	3.90	49.80	35.93	7.46
Probability	0.00	0.14	0.00	0.00	0.02
Sum	130.81	112985.29	137019.45	3999.27	52.51
Sum Sq. Dev.	1160.20	299063553.72	841219071.82	647876.88	37.57
Observations	43	43	43	43	43

Source: EViews 13

The correlation matrix is also presented in Table 2 to show the extent of correlation and relationships among the variables of interest. The correlation, as shown in Table 2, implies the existence of a very high correlation among the variables. A correlation of 0.05 percent is found between GDP and government spending, while a correlation of 0.62 percent is found between oil revenue and government spending. In the same vein, a correlation of 0.32 percent is also found between GDP and oil revenue; we therefore conclude that close relationships and high correlation exist among some of our selected variables.

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Table 2: Correlation Matrix of Variables used

	GDP	OILR	GEXP	CPI	FDI
GDP	1	0.32	0.05	0.04	0.35
OILR	0.32	1.00	0.62	0.61	0.12
GEXP	0.05	0.62	1	1.00	-0.26
CPI	0.04	0.61	1.00	1	-0.28
FDI	0.35	0.12	-0.26	-0.28	1

Source: EViews 13

5.2 The Model

In determining the dynamic relationship between oil revenue, government expenditure, and economic growth in Nigeria, this research adopts the endogenous growth model from Aghion and Howitt (1992) and Romer (1990) production function, which is also referred to as the AK model. This model attributes economic growth to technological progress. A theoretical framework for analyzing endogenous growth, persistent growth that is dictated by the system controlling the production process rather than external forces, is offered by the new growth theory. As opposed to the conventional neoclassical view, which contends that growth is solely dependent on exogenous technological advancement at steady state and that saving and investing cannot result in sustained growth because of declining returns (Solow 1956). In contrast, the endogenous model maintains that growth is sustained because human capital investment slows the rate of declining returns. The goal of the endogenous growth model is to provide an explanation for the growth rate that the Solow (1956) neoclassical growth model leaves unexplained and exogenously driven. According to the endogenous growth model, government spending and revenue actively support economic development by making direct and indirect investments in infrastructure, research and development, and human capital formation (education). The production function is presented as:

$$Y = AK \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

where A stands for technological advancement, K for capital stock, and Y for production, also referred to as GDP. It is believed that when technology advances, capital increases in effectiveness within the economy. Capital accumulation yields constant returns according to this interpretation of the production function. It should be mentioned, though, that oil revenue does make up a portion of the money the government uses to fulfill its budgetary obligations. Because a rise in government expenditure raises the amount of capital in the economy and vice versa, government spending can thus have an impact on capital levels. According to Okoro (2009), capital is broken down into government spending and oil revenue and shown as follows:

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$$GDP = f\ (OILR, GEXP, FDI, CPI) \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$GDP_t = \beta_0 + \beta_1 OILR_t + \beta_2 GEXP_t + \beta_3 FDI_t + \beta_4 CPI_t + \mu_t \ldots\ldots\ldots\ldots\ldots (3)$$

Where:

GDP is the GDP growth rate, OILR is oil revenue, FDI is foreign direct investment inflow percentage of GDP and CPI connotes consumer price index, μ_t is the error term, β_0 is the intercept and $\beta's$ are the coefficients. The Autoregressive Distributed Lag (ARDL) model, as proposed by Pesaran *et al.* (2001) and Pesaran and Shin (1999), was utilized to investigate the dynamic relationship among oil revenue, government expenditure, and economic growth in Nigeria. The ARDL methodology was employed due to its robustness and consistency in time series analysis. According to Saungweme and Odhiambo (2019), the reason for applying the ARDL method amongst other conventional cointegration methods is the clear advantage ARDL has over other alternatives. Firstly, the ARDL bounds testing approach allows the analysis of long-term relationships between variables, regardless of whether they are stationary at levels, I(0), or first difference, I(1), or a mixture of both. Secondly, the long-run and short-run parameters can be computed simultaneously. Finally, while working with a small sample size, this method is the most appropriate to use. However, given the methodology employed for the analysis (ARDL), equation 3 will be written as:

$$\Delta lnGDP_t = \beta_0 + \beta_1 lnGDP_{t-i} + \beta_2 lnOILR_{t-i} + \beta_3 lnGEXP_{t-i} + \beta_4 lnFDI_{t-i} + \beta_5 CPI_{t-i} + \sum_{i=0}^{p} \beta_6 \Delta lnGDP_{t-i} + \sum_{i=0}^{p} \beta_7 \Delta lnOILR_{t-i} + \sum_{i=0}^{p} \beta_8 \Delta lnGEXP_{t-i} + \sum_{i=0}^{p} \beta_9 \Delta lnFDI_{t-i} + \sum_{i=0}^{p} \beta_{10} \Delta CPI_{t-i} + ECM + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Note that all the variables remain as previously described, but Δ stands for the difference (or change) in respective variables and (-) is the lag sign. In satisfying the long-run relationship, the ARDL bound test requires a null hypothesis for no co-integration $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$; for equation (4). There are several models for research of this nature, however, models should be selected based on the track record of their use in terms of consistency, efficiency, and finally, adequacy of the model for peculiar research. The autoregressive distributed lag error correction model was selected due to its relative robustness, efficiency, and the advantage of being able to aid in forming inferential information on the dynamic nature of the variables.

5.3 Empirical Analysis

5.3.1 Unit root

To properly investigate the trend relationship and the nature of stationarity, the Augmented-Dicky Fuller test (ADF) at level and first difference was employed to eliminate the tendency of getting spurious results. The empirical result is presented in table 4 below:

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Table 3: Augmented Dicky Fuller Test for Unit Root

Variables	Levels	FirstDiff	Status
GDP	*0.0029(**)*	*0.0027*	I(0)
OILR	*0.5864*	*0.048* **	I(1)
GEXP	*0.9989*	*0.0396* ***	I(1)
FDI	*0.0055*	*0.0000*	I(0)
CPI	*0.4670*	*0.0273*	I(1)

Notes a: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1% and (no) Not Significant, b: Lag Length based on AIC, c: Probability based on MacKinnon (1996) one-sided p-values.

The ADF result indicates that while some of the variables are stationary at level, some are stationary at first difference. From the p-values, GDP is stationary at level at 5% level of significance with a p-value of 0.0029, which is less than 0.05. Foreign direct investment is also stationary at level. However, OILR, GEXP, and CPI are stationary at first difference with p-values of 0.048, 0.0396, and 0.0273, respectively.

5.3.2 Cointegration Test for Long Run Relationship

To ascertain whether a cointegration relationship exists among the variables, we adopted the Bound Test (ARDL). The result of the bounds test demonstrates strong evidence of a long-run relationship among the variables when compared with the Pesaran *et al.* (2001) critical value at the lower and upper bounds. There is a long-term association between GDP and its determinants because the F-statistic of 4.58 in the model is higher than both the lower and upper bounds critical value at 5% and 10% levels of significance. As a result, the ARDL co-integration method is used to estimate our equation over the long term.

Bound test

Null hypothesis: No levels relationship

Number of cointegrating variables: 4

Trend type: Rest. constant (Case 2)

Sample size: 39

Test Statistic	Value
F-statistic	4.5840

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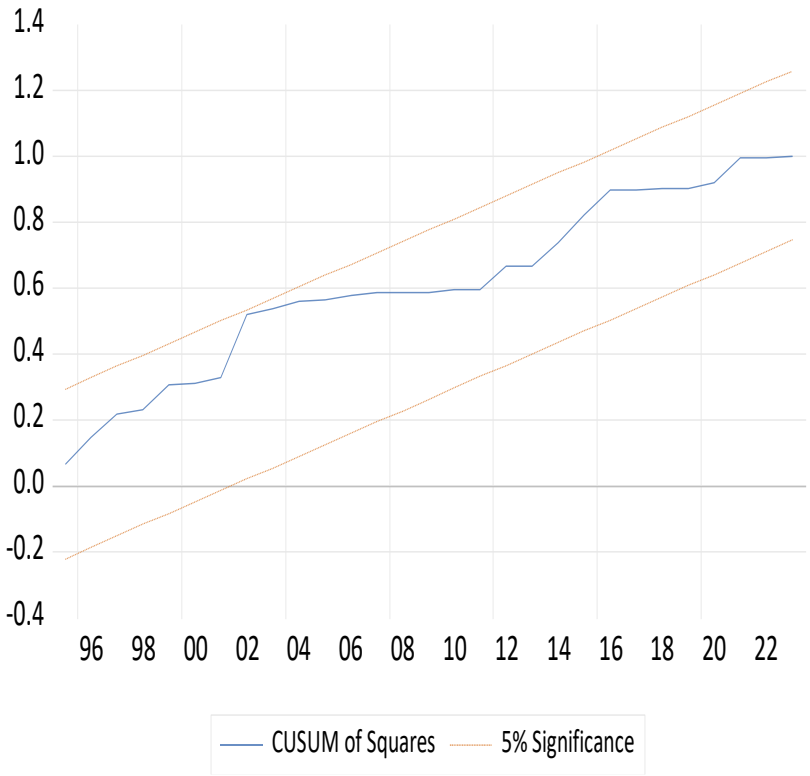
	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
35	2.46	3.46	2.947	4.088	4.093	5.532
40	2.427	3.395	2.893	4	3.967	5.455
Asymptotic	2.2	3.09	2.56	3.49	3.29	4.37

* I(0) and I(1) are respectively the stationary and non-stationary bounds.

5.3.3 Stability and Pre-diagnostic Test

A very important property in the estimation of a model is the constancy or stability of parameters used in that model. We therefore applied the CUSUM and CUSUMSQ tests developed by Brown *et al*. (1975). The statistics are within the crucial 5% critical boundaries according to the plots of the CUSUM and CUSUMSQ, indicating that the model's coefficient is stable as shown below.



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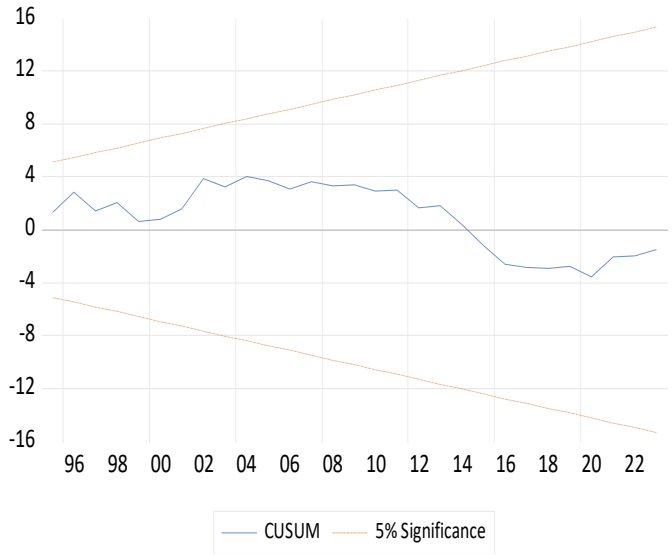

5.3.4 Short and Long Run Results

Oil revenue and government expenditure have a positive effect on GDP in the short run and long run. However, they are not statistically significant in determining economic growth in Nigeria. Lastly, the error correction term is well-behaved and signed with a negative value. It shows a high speed of adjustment of 0.69% after a deviation from the short run to the equilibrium value.

Table 4: The short and long run results

Dependent variable: GDP				
Variables	**Coefficients**	**Std-error**	**t-statistics**	**Prob.**
GDP(-1)	0.3048*	0.1716	1.7760	0.0862
OILR	0.0003	0.0003	1.0321	0.3105
GEXP	0.0007	0.0013	0.5342	0.5973
CPI	-0.0328	0.0493	-0.6655	0.5110
FDI	-0.4395	0.7123	-0.6170	0.5421
FDI(-1)	1.5500**	0.6891	2.2492	0.0323
FDI(-2)	-0.6095	0.7462	-0.8169	0.4206
FDI(-3)	0.8754	0.7159	1.2227	0.2313
FDI(-4)	-1.5771**	0.6611	-2.3854	0.0238
C	3.0471*	1.7783	1.7135	0.0973
COINTEQ*	-0.6952***	0.1469	-4.7327	0.0000

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Note: *,**,* Significant at 1%, 5% and 10% respectively.**

5.3.5 Granger Causality

Considering the pairwise Granger causality test in Table 5, we found government expenditure to Granger cause economic growth over the period of study at 5% level of significance. This finding supports the Keynesian hypothesis that government spending promotes economic growth. In addition, government expenditure is found to Granger cause oil revenue at 1% level of significance, meaning that government spending significantly explains the behavior of oil revenue in Nigeria. It implies that government expenditure is a driver of oil revenue in Nigeria. This suggests that changes in oil revenue and government expenditure do significantly lead to changes in GDP (and vice versa) over the selected period.

Table 5: Pairwaise Granger Causality Result

Null Hypothesis	F-Statistics	P-values	Interpretation
OILR does not Granger Cause RGDP	4.5213	0.015	Reject null → OILR Granger-causes RGDP
GDP does not Granger Cause OILR	3.8921	0.042	Reject null → RGDP Granger-causes OILR
GEXP does not Granger Cause RGDP	2.8419	0.068	Reject null → Weak causality from GEXP to RGDP
GDP does not Granger Cause GEXP	5.1035	0.009	Reject null → RGDP Granger-causes GEXP

6.0 CONCLUSION AND RECOMMENDATION

This paper investigates the dynamic relationship between oil revenue, government expenditure, and economic growth in Nigeria for the period of 1981 to 2023. After detecting the non-stationarity of variables, it was observed that cointegration existed among the variables. However, the short-run and long-run results show positive effects of government expenditure on economic growth, while oil revenue shows positive effects on economic growth. The Granger causality revealed a unidirectional causality running from government spending to economic growth and a unidirectional causality running from government expenditure to oil revenue. The implications of these findings are as follows. First, there is a significant relationship between government expenditure and oil revenue. This implies that the Keynesian hypothesis holds in Nigeria, where government spending is a catalyst for growth. Secondly, the spending-tax hypothesis also holds where government spending is the driving force of revenue generation. Finally, given that Nigeria is an oil-dependent economy with the bulk of government revenue coming from oil exports, it is reasonable to recommend that the government should diversify the economy away from crude oil and natural gas to non-oil

revenue-generating sectors such as agriculture, mining, and services, and spend more on the non-oil sector and thus improve the economic growth of Nigeria.

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